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ΣΕΜΙΝΑΡΙΟ ΣΕΜΙΝΑΡΙΟ

ΟΜΙΛΗΤΡΙΑ: **Christèle Combes**, Professor
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ΘΕΜΑ: **Biological apatites and apatite-based biomaterials: the physico-chemical point of view**

ΤΟΠΟΣ: Αίθουσα Σεμιναρίων ITE/IEXMH

ΗΜΕΡΟΜΗΝΙΑ: **Τετάρτη, 27 Ιουλίου 2016**

ΩΡΑ: **12:30**

ΠΕΡΙΛΗΨΗ

Calcium phosphate apatites offer outstanding biological adaptability which can be attributed to their specific physico-chemical and structural properties. Nanocrystalline apatites are involved in living organisms mainly as the major constituent of bones. They can be defined by four main characteristics (1) non-stoichiometric chemical composition; (2) presence of bivalent HPO_4^{2-} and CO_3^{2-} anions; (3) plate-like crystals, rather unusual for apatites; (4) developed surface hydrated layer determining their reactivity and biological activity. Due to the complex structure and heterogeneity of biological systems such as bone, synthetic apatites are generally used to throw light on the surface reactivity of bone mineral. The actual conception of the fine structure of synthetic and biological apatites, which is essentially based on the existence of a hydrated layer at the surface of the nanocrystals will be discussed. The imitation of bone mineral has also inspired the research and development of apatite-based biomaterials. Although biomimetic



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apatites have been found to exhibit interesting biological properties their use as biomaterials is hindered by difficulties of processing related to their strong reactivity and instability. Apatitic biomaterials can be processed at low temperature which preserves their surface reactivity and biological properties. They can also be associated in various ways with active molecules and/or ions. Indeed the reactivity of the hydrated layer at the surface of apatite nanocrystals offers material scientists and medical engineers extensive possibilities for the design and functionalization of biomaterials with improved bioactivity using unconventional processing. Several examples of use and processing of nanocrystalline apatites involved in the preparation of bioactive cements, ceramics, composites and coatings will be presented.

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Academic background

Jan. 2005: Research direction habilitation diploma (HDR), Institut National Polytechnique, Toulouse

Sept. 1996: Ph.D in Materials Science, *with honours*, Institut National Polytechnique, Toulouse

July 1993: "Master of science" in Materials Science, *with honours*, Université Paul Sabatier, Toulouse

June 1992: "Maîtrise" in Chemistry, Paul Sabatier University, Toulouse

Research experience

Oct 2011 – now: Professor, ENSIACET, Institut Carnot CIRIMAT UMR 5085,

Jan.2007-dec 2015: Head of the "Phosphates, Pharmacotechnie, Biomatériaux" group of CIRIMAT

Sept. 98-Sept. 2011: Assistant professor, ENSIACET, CIRIMAT UMR 5085,

1998: Postdoctoral position (6 months), Laboratoire de Pharmacie Galénique,

Faculté des Sciences Pharmaceutiques, Université Paul Sabatier, Toulouse

Nov. 96-Oct. 97: Postdoctoral position, Centre de Recherche Appliquée sur les Polymères

Département de Génie Chimique, Ecole Polytechnique de Montréal, CANADA.

1993-1996: PhD thesis, INPT, Laboratoire des Matériaux UPRESA CNRS 5071, ENSC Toulouse

Teaching experience

Sept. 98- now: Inorganic chemistry, Industrial chemistry, Analytical chemistry, Biomaterials,

Ceramics, 1st, 2nd and 3rd year engineer students, ENSIACET, Toulouse, France.

Research topics

Calcium phosphate- and calcium carbonate-based biomaterials and biomineralisations: synthesis, characterisation and properties.

Scientific production

62 publications in international journal with review committee, 44 proceedings with review committee, 8 patents including 4 PCT extensions and 2 with licence, 10 book chapters and 24 invited conferences (including 19 international)
